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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
230 SOUTH DEARBORN ST.  
CHICAGO, ILLINOIS 60604

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**EXPRESS MAIL**

April 24, 1991

REPLY ~~5/19/91~~ ATTENTION OF:

Peter Vagt  
Warzyn Engineering Inc.  
435 Devon Park Drive  
Suite 702  
Wayne, PA 19087

Re: Remedial Investigation Report Comments - American Chemical  
Services NPL Site - Griffith, Indiana

Dear Dr. Vagt:

Enclosed as Attachment 1, you will find compiled comments from U.S. EPA, IDEM, U.S. Fish & Wildlife Service and Weston Inc. on the American Chemical Services Remedial Investigation Report submitted to U.S. EPA in final form on January 31, 1991. According to the Consent Order for this site, you have thirty (30) days from your receipt of these comments to revise the documents.

Of particular importance in the comment package is a four page segment titled *Example Analysis for Ecological Assessment*. This segment of the comment package is intended to provide an example of what the Region expects in a comprehensive ecological assessment. Please have your risk assessors review this example analysis, and then contact me with a date for U.S. EPA representatives and Warzyn to meet. The agenda of the meeting will be to provide Warzyn enough insight on what the Region expects in an acceptable ecological assessment.

If you have any questions concerning the enclosed comment package, please contact me at (312) 886-5116.

Sincerely,

Robert E. Swale  
Remedial Project Manager

Enclosure

cc: Kevin Domack, Warzyn-Madison w/enclosure  
Rudy Thurman, IDEM w/enclosure  
Jim Burton, Weston w/enclosure

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5HS-11

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## Attachment 1

1. Section 1, Page 2, Paragraph 2, Line 3 - Replace the word *required* with the word *performed*.
2. Section 1, Page 3, Paragraph 1, Line 6 - Reference to a two-phased investigation should be updated to include the recent third phase of site work.
3. Section 1, Page 3, Paragraph 1, line 8 - Section 5 should be completed in the next revision to the document. Accordingly, this reference should be omitted.
4. Section 1, Page 4, Paragraph 1 - What solvent waste was reclaimed prior to 1970? Any information should be presented here or included in an appendix.
5. Section 1, Page 4, Paragraph 1, Line 3 - The following passage should be deleted: *ACS is an active solvent recovery and chemical manufacturing facility operating under RCRA Part B Interim Status.* And replaced with: *ACS is an active chemical manufacturing facility which formerly accepted hazardous waste solvents for recycling under RCRA Interim Status. Due to a U.S. EPA enforcement action finalized in September 1990, ACS ceased accepting hazardous wastes and is currently undergoing full RCRA closure, under State oversight.*
6. Section 1, Page 4, Paragraph 4 - This portion of the discussion, should mention the use of the still bottoms pond for the storage of still bottoms, prior to the installation of the incinerators at the facility.
7. Section 1, Page 5, Paragraph 1 - What were the specialty chemicals manufactured prior to 1970? Any information should be presented here or included in an appendix.
8. Section 1, Page 5, Paragraph 2 - Where were the incinerators removed to, or were they just dismantled? An explanation should be provided here.
9. Section 1, Page 5, Paragraph 3 - What solvent waste was reclaimed from 1970 to 1975? Was it the same as the waste reclaimed prior to 1970? Any information should be presented here or included in an appendix.
10. Section 1, Page 6, Paragraph 1 - The heading: *1975 to Present* should be changed to: *1975 to 1990.*

11. Section 1, Page 6, Paragraph 1 - What solvent wastes are still used? Are they the same as those used prior to 1970 and from 1970 to 1975? Any information should be presented here or included in an appendix.
12. Section 1, Page 6, Paragraph 1, Line 2 - The sentence: *Solvent recovery remains the principal operation at ACS*, should be changed to: *Solvent recovery was the principal operation at the ACS facility until September 1990, when ACS lost interim status due to an EPA enforcement action*. On line 5, the word *are* should be replaced with the past tense *were*, and on line 6, *are* should be replaced with *were*. Additionally, it should be mentioned in this paragraph that the tanks used in the spent solvent recovery operation are currently undergoing closure but are not expected to be dismantled.
13. Section 1, Page 6, Paragraph 5 - According to an ACS response to a CERCLA 104(e) Information Request, John Kapica began picking up from ACS, "empty dirty drums that had contained hazardous waste" circa 1955. In 1961, ACS sold a 2 acre parcel to Kapica, and in 1962, Kapica began operation of his drum reclaiming business at the South Colfax Avenue location. The text should reflect this information here and in subsequent references.
14. Section 1, Page 7 - Please provide a title for each individual section describing a unit. For example, for paragraph 1 on this page, an appropriate title may read: *Still Bottoms Pond and Treatment Lagoon #1*, or similar. Please provide a title for each series of paragraphs describing an individual operable area or unit at the site.
15. Section 1, Page 7, Paragraph 1 - How is it known that the Still Bottoms Pond and Treatment Lagoon #1 were taken out of service in 1972? Is this statement based upon examination of a 1973 aerial photograph or other sources? Please explain.
16. Section 1, Page 7, Paragraph 1; Figure 1-2; and Aerial Photograph B22 (1970) - The 1970 aerial photograph shows a dark feature which may be a ditch draining to the west in the same area as the oily soil in Figure 1-2. Could there be some correlation? The 1970 aerial photograph also shows a dark area just to north of the Fire Pond. Was it a wet area or another pond? Please address.
17. Section 1, Page 7, Paragraph 2; Figure 1-2; and Aerial Photograph B22 (1970) - The 1970 aerial photograph shows two

ponds or lagoons in the Off-Site Containment Area when disposal occurred in that area. These should be mentioned in historical text (Subsection 1.3.2) and possibly shown in Figure 1-2. To account for this replace sentence 5 with the following: *In the 1970 photograph, numerous drums are present in this area, as well as two ponds or lagoons.*

18. Section 1, Page 8, Paragraph 2; Figure 1-2 - The location of the former incinerators should be shown on Figure 1-2 and referenced in the text. To correct this insert the following after Sentence 1: *They were located on the eastern portion of the property near Colfax Avenue (Figure 1-2).*
19. Section 1, Page 8, Paragraph 4 - It should be mentioned that the Village of Griffith, in its response to an EPA Information Request, has challenged the assumption that hazardous wastes were disposed in the landfill. The Village insists that they were very careful not to accept hazardous wastes into their landfill.
20. Section 1, Page 8, Paragraph 5; Figure 1-2; and Aerial Photograph B22 (1970) - The 1970 aerial photograph shows a pond or lagoon in the west-northwest area of Kapica/Pazmey. This should be mentioned in historical text (Subsection 1.3.2). This location corresponds to black sludge found to be oozing out of the ground during the Phase II investigation. Could there be some correlation? Both the pond/lagoon and the black sludge should be shown on Figure 1-2. To account for this, the following should be added to the end of the paragraph: *In the 1970 aerial photograph (Appendix A), a pond or lagoon is visible just to the west of the Kapica Drum area, in the present location of a seep of black sludge (Figure 1-2).*
21. Section 2, Page 1, Paragraph 1, Line 3 - The word two should be changed to *three*.
22. Section 2, Page 1, Paragraph 1, Line 6 - Please insert a description of the goals of Phase III of the RI. Such a description may include the goal of establishing the assumed rate of contaminant plume migration, verification of the extent of plume migration, and a verification that the site was not posing an imminent threat to the local community (i.e., through residential well sampling).
23. Section 2, Page 2, Paragraph 1 - Add the following to the end of the paragraph *..and because the gradient resolution is significant for shallow targets."*

24. Section 2, Page 2, Paragraph 4 - If the purpose of the EM surveys involved ferrous detection in the On-Site and Off-Site Containment Areas, the data resolution would have been significantly more informative if the in-phase component of the induced magnetic field had been measured. Please provide the data interpretations for the EM data.
25. Section 2, Page 5, Paragraph 2 - The RI work plan called for bentonite grout to be used from the seal to within three feet of the surface and cement-bentonite grout used from there to the surface. The RI report says that cement-bentonite grout was used from the seal to the surface. This is an acceptable alternative, but this field decision should be noted in the text. To account for this, insert after Sentence 8: *The SAP called for bentonite grout to be used above the bentonite seal to within 3 feet of the surface and for cement-bentonite grout from this point to the surface. However, cement-bentonite grout was used from the seal to the surface.*
26. Section 2, Page 5, Paragraph 3 - The SAP stated that piezometers would be installed by jetting them into the ground, except for piezometers in the landfill, which were to be drilled. The RI Report says that all piezometers were installed by drilling. This is an acceptable alternative, but this field decision should be noted in the text. To account for this, change Sentence 2 to read: *Piezometer installation was completed following the guidelines described in the QAPP and SAP, except drilling was used on all installations, instead of jetting most of them into the ground as originally planned.*
27. Section 2, Page 6, Paragraph 2, Line 3 - The phrase *shot to* should be replaced with *established to*, and following the word *gages* in the same sentence, the phrase *by surveying* should be added.
28. Section 2, Page 6, Paragraph 5 - One minor discrepancy was identified in the methods used and those established in the QAPP and SAP for sampling surficial soil. The SAP had specified a shovel and a hand bucket auger for surficial sampling. The RI report stated that a drill rig and a 3-inch split-spoon sampler were used to collect surficial soils. This is an acceptable alternative, but this field decision should be noted in the text. To facilitate, change the last sentence to: *Instead of using a shovel and hand bucket auger as specified in the QAPP and SAP, it was decided to use the drill rig equipped with the 3-inch outer diameter (o.d.)*

***split-spoon sampler and solid flight augers for the Soil Area sampling.***

29. Section 2, Page 6, Paragraph 5, Line 3 - Following the word ***within***, delete the word ***an***, and replace it with the phrase a ***circular***.
30. Section 2, Page 7, Line 1 - Capitalize ***soil area***.
31. Section 2, Page 7, Paragraph 2 - Auger probes were not a method specified in the QAPP and SAP. The SAP and QAPP stated that all soil and waste borings would be drilled using split-spoon sampling techniques. However, the auger probes were used as a method for optimizing the locations of the soil and waste borings, and not replacing them. This was an acceptable field decision. However, this variance from the QAPP and SAP should be mentioned in the text. To account for this, insert after Sentence 2: ***The auger probe program was not a part of the original field investigation as outlined in the QAPP and SAP, but was added during the field investigation after consultation with, and approval by, the PRP steering committee and the U.S. EPA RPM.***
32. Section 2, Page 8, Paragraph 4 - Section 2.3.2 accurately describes drilling of soil borings. Comparison with WESTON's field notes found no discrepancies. One minor discrepancy was identified in the methods used and those established in the QAPP and SAP for the RI. The SAP stated that the soil borings would be filled with bentonite grout. The RI reports that the borings were filled with bentonite grout or Holeplug. The Holeplug was used because large subsurface gaps in the Off-Site Containment Area made it impractical to use bentonite grout to seal soil/waste borings in this area. Use of Holeplug is an acceptable alternative, but this field decision should be noted in the text by inserting after the last sentence: ***Although Holeplug was not specified as a material to seal boreholes in the SAP or QAPP, it was used because large subsurface gaps in the Off-Site Containment Area made it impractical to use bentonite grout to seal soil/waste borings in this area.***
33. Section 2, Page 10, Paragraph 2 - The RI text states that the surface water samples were filtered or preserved as stipulated under the SAP. The SAP specifically states the surface water samples would not be filtered. WESTON field notes (on 20 July 1990) state the samples were sent unfiltered. This discrepancy should be corrected in the text by changing Sentence 2 to read: ***As stipulated in the SAP, the samples***

**were not filtered. The samples were then preserved, packed, and transported under chain of custody as described in the Sampling and Analysis Plan.**

34. Section 2, Page 13, Paragraph 3 - It is to be mentioned here that the Tracer Investigation was used exclusively as a field screening exercise to aid in monitor well placement, and consequently aid in defining the edge of the contaminant plume using verifiable CLP analyses.
35. Section 2, Page 13, Paragraph 4 - It should be mentioned that a single 3/4 inch diameter pipe was dedicated to each sampling point, and was deconned prior to subsequent use at other locations.
36. Section 2, Page 13, Paragraph 4 - The Poly tubing was also dedicated to each sample point, and was discarded following its use.
37. Section 2, Page 13, Paragraph 5, Line 5 - The following should be inserted prior to the beginning of Sentence 2: **Each vial was shaken prior to sample extraction to increase volatilization, and..**
38. Section 2, Page 13, Paragraph 5 - Explain briefly why the BTEX compounds mentioned in the text were selected as indicator compounds to establish the plume boundary.
39. Section 2, Page 14, Paragraph 1, Line 1 - Replace the phrase **..and Phase II** with **.., Phase II and Phase III**.
40. Section 2, Page 14, Paragraph 2 - The number of sampling rounds which have been completed for Phase III, the expected number of future sampling rounds, and the dates they are expected to be completed is to be inserted in the text.
41. Section 2, Page 14, Paragraph 3 - Please list the analytical parameters analyzed for in the Phase III wells.
42. Section 2, Page 14, Paragraph 3 - The samples analyzed for metals were field-filtered. Although the RI text makes a generic statement in Page 14, Paragraph 4 that QAPP procedures were followed, this subsection should state the metal samples were field-filtered and briefly describe the filtration apparatus used. To account for this, insert after the last sentence: **The metal samples were field-filtered to remove solids to 0.45 microns before being preserved [state apparatus used].**



43. Section 2, Page 15, Paragraph 3 - The collection of Phase III leachate samples needs to be added to the description.
44. Section 2, Page 16, Paragraph 2 - Please amend this section of the text to mention the two additional private well samples collected during Phase III.
45. Section 2, Page 16, Paragraph 3 - It needs to be included in the discussion that each of the private wells sampled, were screened in the lower aquifer and that no upper aquifer private wells were sampled.
46. Section 3, Page 1, Paragraph 1, Line 1 - The word *two* should be replaced with *three*.
47. Section 3, Page 1, Paragraph 1 - In the discussion concerning Phase I, it needs to be mentioned that Phase I additionally was designed to begin an evaluation of the impact of the site to the surrounding surface water features, and to determine the amount of interaction between the surface water and the groundwater. Phase II surface water/sediment sampling was designed to delineate to some degree, the extent of contamination found in Phase I, and to provide an estimate of the volume of contaminated material.
48. Section 3, Page 1, Paragraph 1 - The following should be added to Paragraph 1: *A limited third phase was implemented to complete the groundwater delineation objectives of Phase II and to support the risk assessment assumptions at the site.*
49. Section 3, Page 1, Paragraph 2, Line 2 - Delete the word *both*, and following the phrase *Phase I* delete the word *and*, and insert roman numeral *III* after roman numeral *II*.
50. Section 3, Page 1, Paragraph 2, Line 4 - The phrase *Phase I through Phase II* should be modified to read: *Phase I through Phase III*.
51. Section 3, Page 1, Paragraph 2, Line 6 - Following the words *Phase II* add the phrase *and Phase III*.
52. Section 3, Page 1, Paragraph 2 - Phase II groundwater results need to be discussed in sufficient detail in this section to support the selection of Phase III monitor well and leachate sample locations.
53. Section 3, Page 1, Paragraph 3 - Please expand the discussion of the STI by first explaining the rationale for expanding the

volume of Phase II waste sampling in excess of 500%. That is, what requirements were being fulfilled and what benefits reaped by expanding the scope of activity this amount.

54. Section 3, Page 1, Paragraph 4, Line 4 - Following the words *Phase II*, add the phrase: *and Phase III*.
55. Section 3, Page 2, Paragraph 1 - Summarize the leachate well analytical results and explain why further samples were not taken in Phase II but were taken in Phase III.
56. Section 3, Page 2, Paragraph 2 - Explain the conclusions drawn from the water levels that were collected from MW01, MW15, LW03, LW02, P16 and P19. Did they reveal for instance that the leachate gradient was flowing toward, away or parallel to the wells?
57. Section 3, Page 2, Paragraph 3, Line 3 - Replace the word *collect* with the word *collected*.
58. Section 3, Page 2, Paragraph 3 - The text should mention that surficial soil samples were required in the work plan near the On-site Containment Area for Phase I. However, following the field staking exercise prior to site work, it was decided between the RPM and Warzyn that any soil area samples collected from this location would not benefit the investigation because it was unlikely that the soils were contaminated. This conclusion was reached due to knowledge of past activity; Because of recent filling and grading; and due to the high permeability of the soils which, it was assumed facilitated, volatilization and natural washing due to precipitation.
59. Section 3, Page 2, Paragraph 4 - Briefly summarize what the Phase I results were and how it was decided that additional sample collection was not necessary (i.e., low levels, non-detectable quantities, below risk levels, etc.)
60. Section 3, Page 2, Paragraph 5, Line 2 - Replace the word *collect*, with the word *collected*.
61. Section 3, Page 3, Paragraph 1, Line 2 - Following the word *fill*, delete the words *with various*, and replace them with the word *containing*.
62. Section 3, Page 3, Paragraph 1 - Please expand on the analytical results of surficial soil sampling from the Kapica/Pazmey area. For example, what other substances were

found in the soils there, and were they at significant concentrations?

63. Section 3, Page 3, Paragraph 2 - Explain why PCBs were chosen as the only parameter to be analyzed for in Phase II analyses. Were the other substance groups abandoned due to their non-detection or were they excluded because of other factors?
64. Section 3, Page 4, Paragraph 1 - Phase I sampling also indicated phenolic compounds in the surface water near the Off-site Containment Area. This needs to be mentioned in the text.
65. Section 3, Page 4, Paragraph 3 - Did interviews with ACS employees reveal any additional information that was used to investigate the drum burial at this location?
66. Section 3, Page 5, Paragraph 2, Line 1 - Following the word *initiating* insert the word *any*. Also, *Appendix O* should be *Appendix C*.
67. Section 3, Page 5, Paragraph 4, Sentence 1 - Replace the word *resistivity* with the word *conductivity*.
68. Section 3, Page 5, Paragraph 5 - Briefly summarize the findings in the auger probes. For example, the following type of explanation could be useful: *three to four distinct areas were identified based upon staining or high Hnu readings*.
69. Section 3, Page 6, Paragraph 3 - The second sentence in the bullet beginning with SB09A is incomplete and unclear. Please address.
70. Section 3, Page 7, Paragraph 5, Line 2 - Following the word *surface* delete the word *is*.
71. Section 3, Page 14, Paragraph 3 - Summarize the results of the Phase I fire pond samples and indicate why further sampling was not necessary.
72. Section 3, Page 14, Paragraph 5 - No mention is made here of possible correlation of the dark ditch feature in Aerial Photograph B22 (1970) and the oily area west of the fire pond. This possibility should be addressed by inserting the following after last sentence: *In the 1970 aerial photograph (Appendix A), a drainage ditch is apparent near the location of P-37. The drainage ditch has since been filled, but it is a possible source of the brownish-red oily substance.*

73. Section 3, Page 14, Bullet 2 (bottom of page) - Following the word **sample**, delete the word **a**, and replace it with the word **of**.
74. Section 3, Page 15, Paragraph 5 - According to the response from ACS to a U.S. EPA 104(e) information request, ACS did not conduct business with Mr. Pazdro following the purchase of the enterprise from Mr. Kapica. According to the ACS response, Mr. Pazdro retained his own set of clients which did not include ACS. This needs to be mentioned in the report.
75. Section 3, Page 18 - Please explain in the text why it was thought necessary to proceed with further delineation of the types and distribution of hazardous substances in the soils and wastes at the site. Was the purpose to facilitate risk assessment, the cost estimate, etc.?
76. Section 3, Page 19, Paragraph 5 - Most of the auger probes (AP-63 to AP-71) and three of the soil borings (SB-40, SB-41, SB-42) contained evidence of garbage disposal and leachate in the west and southwest areas of the Off-Site Containment Area. This observation should be stated in this section and discussed briefly by deleting Sentences 3 and 4 and replacing them with: *In general, many of the auger probes and soil borings contained evidence of municipal garbage buried in these areas at depths from 3 to 10 feet, making it difficult to distinguish the boundary between the ACS waste and the Griffith Municipal Landfill. Three soil boring locations, SB-40, SB-41, and SB-42, were selected to represent the subsurface conditions in this area. These soil borings were drilled in several locations before representative samples for soil analysis were obtained. The subsurface contents at these three boring locations indicate that municipal waste was placed over buried ACS waste or directly adjacent to it.*
77. Section 3, Page 20, Paragraph 1 - No mention is made here of a possible correlation between one of the three lagoons or ponds identified in aerial photographs and the dark oily substance leaking from underground. This and any other correlation between ponds and waste areas should be addressed. add after the last sentence: *"The location of the oily seep corresponds to the location of a pond or lagoon located to the west of the Kapica Drum Recycling Area and identified in the 1970 aerial photograph (Appendix A). The oily seep may be a remnant of this lagoon or pond. Two other ponds or lagoons can be seen in the general area of the Off-Site Containment Area in the 1970 aerial photograph."*

78. Section 3, Page 21, Paragraph 2, Line 4 - The following passage should be deleted: *Phases I and II, and in the lower aquifer in Phase II*, and replaced with: *Phases I, II, and III and in the lower aquifer in Phases II and III*.
79. Section 3, Page 21, Paragraph 6, Line 2 - Following the word *to*, insert the word *and in*, and replace the word *determine*, with the word *determining*. On line 4, the word *at* should be replaced with the word *near*.
80. Section 3, Page 22, Paragraph 1 - Is the reported instrument sensitivity of 5 ug/l for contaminants contained in an aqueous solution, or is it actually the detection limit of contaminants in the vapor phase? It is probable that the method sensitivity would be much lower and would depend upon various factors pertaining to the sample media (i.e., the temperature of the water, turbidity etc.), if the reported sensitivity pertains to the concentration in the aqueous phase. If the method sensitivity pertains to the vapor phase, then it should be mentioned that the units of concentration (i.e., ug/l) is not equivalent to ug/l in the an aqueous solution and would also be reported in the units ug/m<sup>3</sup>.
81. Section 3, Page 22, (Well Location Listing for Phase II) - Phase III upper aquifer wells should be added to this listing.
82. Section 3, Page 22, Paragraph 2 - References to the addition of Phase III wells should be added to the discussion here.
83. Section 3, Page 23, Paragraph 1 - The additional Phase III lower aquifer wells which were placed at the site should be included in the discussion. Also, the rationale behind the selection of the locations for all of the lower aquifer wells should be discussed here as well.
84. Section 3, Page 23, Paragraphs 1 & 2 - Isn't MW-10 located northwest of the site?
85. Section 3, Page 23, Paragraph 3 - This section should be re-written to reflect the addition of the Phase III lower aquifer wells and the reasons for their placement. Generally it is thought that the rationale should reflect that the wells were placed to ensure that contamination was not leaving the site and to possibly determine the horizontal extent of the plume in some areas of the site. The section must also mention that further evaluation of the lower aquifer will be necessary to fully delineate the plume boundaries.

86. Section 3, Page 24, Paragraph 2 - The Phase III private wells should be added to this discussion.
87. Section 4, Page 2, Paragraph 3 - The RI report does not provide an explanation for why these surface features have a great effect on the site conditions, nor does it list the surface features that are affected. Brief summary statements or a reference to where this effect is explained is necessary for this paragraph to be meaningful. To correct this insert after last sentence: *These features are major factors in the surface water drainage and groundwater infiltration of the site and their effects are examined in Section 4.4.2.*
88. Section 4, Page 4, Paragraph 6, & Page 5, Paragraph 1 - An explanation should be given to correlate between what was learned in the field investigation and what had been suggested in the literature - that is, the field determination that clay is thinning in a northwestern direction despite the regional cross-section in Figure 4-1 showing that the confining layer pinches out to the south. To account for this, insert at the end of the paragraph: *There is no indication from the RI's subsurface investigations that the confining clay layer pinches out to the south near the ACS site, as suggested by Figure 4-1. Locally, the clay layer is thickest to the south and is continuous throughout the investigation area.*
89. Section 4, Page 5, Paragraph 4 - Which on-site water supply well is the text referring to? Is the driller's log in any appendix? Please clarify.
90. Section 4, Page 6, Paragraph 2 - More detail is needed to support the claim that surface water from the site lies in the Mississippi water shed, rather than in the Lake Michigan watershed. The quadrangle map provided in the figures is not clear in its presentation of ground elevations. Many of the contour lines are missing due to photocopying. An enhanced copy of the map showing all contour lines and a graphical interpretation of the local and regional flow patterns and directions (i.e., by using arrows to illustrate surface flow directions) based upon the contour elevations would be sufficient to document the location of the continental divide in the area.
91. Section 4, Page 6, Paragraph 3 - Which drainage ditch is discussed in the last sentence of the paragraph? Is there a drainage ditch along the linear contours referred to in the paragraph, and does it directly connect with Turkey Creek? Please clarify.

92. Section 4, Page 7, Paragraph 1 - The discussion about surface drainage to the north of the site near the northern ACS fence and the east-west railroad is incomplete. No mention is made of the intermittent drainage ditch which drains to the north away from the ACS fence and toward the woods between the fence and the railroad. Water from this ditch infiltrates into the ground in this woods. Also, no mention is made of the culvert under the railroad tracks. This culvert connects a system of drainage ditches to the north of the railroad tracks with the drainage ditch that "flows into the site at the northern boundary directly north of the western ACS fence line." These drainages are not marked on Figure 4-12 and should be added. To clarify and correct this insert the following before Sentence 1: *An intermittent drainage ditch drains to the north, away from the north ACS fence and toward the woods between the fence and the railroad. Water from this ditch infiltrates into the ground in this woods. This ditch is only active during precipitation events. To the north of ACS, the ditch along the south side of the railroad (railroad north of ACS site) ends at a culvert under the railroad tracks. This culvert connects to a network of drainage ditches to the north of the railroad. The remaining surface water flows past ... north to south.*
93. Section 4, Page 7, Paragraph 2 - The pre-1980 flow directions should be outlined on an overlay of the aerial photo, or on a map created from the aerial photo to show the historical surface water flow directions at the site.
94. Section 4, Page 8, Paragraph 2, Line 11 - At the end of the sentence ending with the word *purposes*, add the following sentence: *However, some residents near the site had used the upper aquifer for drinking water purposes within the last three years.*
95. Section 4, Page 8, Paragraph 3 - The text states that in some places the clay till is absent. This statement implies that in some locations the Calumet Aquifer and the Valparaiso Aquifer are hydrologically connected. Please discuss whether this inference is correct, and what effect this occasional interconnection will have on the potentiometric surfaces of the two aquifers.
96. Section 4, Page 9, Paragraph 2, Line 5 - Insert the following sentence following the word *supplies*: *However, in the past, wells screened in the upper aquifer near the site, had been used for drinking water supplies.*

97. Section 4, Page 12, Paragraph 1 - Does the lower elevation of the clay in the leachate headwell LW-4 indicate that the landfill operators excavated a portion of the clay layer during the landfill operations?
98. Section 4, Page 12, Paragraph 2 - In Section 2.5.3, these tests are called "baildown tests." In our experience the term "aquifer test" is usually synonymous with "pumping test," and "baildown tests" are synonymous with "slug tests," or "in situ hydraulic conductivity (permeability) tests." In this paragraph (and in subsequent sections), delete references to *aquifer tests* and replace with one of the aforementioned terms.
99. Section 4, Page 12, Paragraph 2, Line 3 - the reference 2.4 should be changed to 2.5.3. Section 2.4 refers to surface water/sediment sampling.
100. Section 4, Page 12, Paragraph 3 - Please include either a statement, a copy of the pertinent portions of a text, or a copy of the Davis paper in the appendices for reference.
101. Section 4, Page 13, Paragraph 4, Line 4 - The water level measurements are included in Table 2-5 and not in Table 2-4. Please revise.
102. Section 4, Page 14, Bullet (P-8) - Please explain the description: *its equivalent on-site measurement point*.
103. Section 4, Page 15, Paragraph 1 - Please clarify whether the "normal" hydrograph is based upon groundwater elevations or on surface water discharge.
104. Section 4, Page 15, Paragraph 2 - The summer and fall of 1989 was a very dry period for much of the United States. Many areas of the Midwest were under drought conditions. However, the precipitation report for Griffith, Indiana, as listed in Table 4-1, shows that 58.1 inches of precipitation fell in 1989. This level is well above the annual average of 37 inches of precipitation per year (as listed in Section 4.1). If 1989 is examined by month, May, June, July, August, and September were the wettest in Griffith, with October, November, and December having significantly less precipitation. Therefore the hydrograph for SG-7 seems to follow the precipitation pattern of 1989. The statement that the normal recharge pattern was not followed may be inaccurate. To clarify and correct this, on Line 2 following the word *hydrograph* insert the word *precisely*. Then delete



and replace the last sentence with: *This hydrograph does reflect the precipitation pattern of 1989 (which was an above average year for precipitation) for Griffith, Indiana. This area experienced a very wet May, June, July, August, and September while October, November, and December had significantly less precipitation.*

105. Section 4, Page 17, Paragraph 1, Line 1 - Delete the words *have been*, and replace them with the words *apparently were*.
106. Section 4, Page 17, Paragraph 3 - It is to be mentioned that although it appears that the ditch may be providing a low resistance path for groundwater discharging to the surface, this does not preclude the possibility that contaminated groundwater may be by-passing the northern ditch and flowing off-site. This must be assumed since no piezometric or surface water level data exists in this portion of the site to confirm the assumption in the text.
107. Section 4, Page 17, Paragraph 4 - It must be recognized in the text that the current groundwater elevations are being severely influenced by the dewatering activities at the landfill, and that prior to these activities, groundwater flow direction and gradient were probably significantly different. It should be stated in the text that without the influence of the dewatering at the landfill, groundwater flow direction would most likely be in a west north-westerly direction.
108. Section 4, Page 18, Paragraph 5 - The statement concerning the hardening of the gravel at the site is not necessarily true for all portions of the site. The hardening process is most likely to occur in roadways or access areas where heavy equipment traverses. In areas where heavy equipment does not traverse, the gravel size is likely to remain more constant and provide a high permeability surface which will promote infiltration of precipitation. Although the fire pond acts as the groundwater recharge area at the site, without the fire pond a high rate of infiltration is still likely from the barren sandy area which comprises most of the interior portion of the site. This area then would be expected to continue as the dominant recharge area of the site with or without the fire pond.
109. Section 4, Page 19, Paragraph 3 - It would be better to refer to the high groundwater elevation experienced at P-18 as the result of a perched zone within the landfill. The high elevation is probably occurring due to a buried layer of daily cover (which is typically clay) placed near the well. When it

is referred to as a mounded area, it leads one to conclude that a constant source of water exists at this point, rather than entrapment of water, which is probably occurring.

110. Section 4, Page 21, Paragraph 4 - In the revision to the document, please ensure that all figures etc. are updated to reflect the placement of additional wells and sampling points up through Phase III. As an example, MW-15 which is referenced in the text, does not exist on the referenced figure.
111. Section 4, Page 22, Paragraph 3 - The flow gradients changed slightly in direction from wet to dry seasons. Was the range in the seepage velocities due to seasonal variation? Was there any detectable seasonal pattern in the velocities? Please address. Also in Line 2, the phrase *the gradient* should precede the word *average*.
112. Section 4, Page 22, Paragraph 5, Line 2 - Please define the acronym *NGVD* in the text.
113. Section 4, Page 23, Paragraph 4 - The aquifer test procedures are discussed in Section 2.5.3, and not in Section 2.4.
114. Section 4, Page 25, Paragraph 1 - The isopach map and the top of clay map should include data from the Village of Griffith engineering report which was provided to Warzyn and the Steering Committee through the FOIA process. This engineering report provides an excellent source of data for the thickness and elevation of the clay layer underlying and in proximity to the Griffith landfill.
115. Section 4, Page 25, Paragraph 3, Line 1 - Following the word *clay* insert the word *vertical*.
116. Section 4, Page 27, Paragraph 1 - The vertical hydraulic conductivity values derived from laboratory tests probably underestimate the bulk (field) values due to till fractures and textural inhomogeneities. Fractures were described in Section 4.3.2.2 (Paragraph 1). Secondary permeability typically causes bulk hydraulic conductivity values to be at least one order of magnitude greater than laboratory-derived values. Groundwater flow rates are proportionally higher. If fracture permeability dominates, retardation is probably less due to the smaller surface area of sediment to which the solutes are exposed. On Page 22, Paragraph 1, incorporate the above-stated comment about secondary permeability.

117. Section 4, Page 27, Paragraph 3 - Data currently exists which leads one to believe that differential leakage from the upper aquifer to the lower aquifer has and is presently occurring. The text should explain that there is presently only one lower aquifer monitor well near the area of the suspected leakage and that it is unlikely that this well by itself would show differential leakage considering the confined conditions around it etc. However it can be stated in the text that it is likely that the leakage which has occurred is likely to be small in volume and accordingly does not reveal itself on the piezometric table given the current well configuration.
118. Section 4, Page 28, Paragraph 1 - The analytical data associated with the lower aquifer disputes this claim. This interpretation was based upon four widely spaced lower aquifer wells, which would not reveal subtle mounding due to a small leakage through the confining clay. The interpretation should conclude that a heavy degree of differential leakage could not be recognized between the two aquifers, but that due to the limited number of wells. It should recognize that due to the consistent pattern of contamination in MW-09, that some degree of leakage in the area is known to have occurred.
119. Section 5, Page 1, Paragraph 3 - An additional map or maps should be produced for the major semi-volatile groups that are present at the site. This will be beneficial during the evaluation of the various alternatives presented in the FS. Possible groups to be included in these mappings may include total phenols, total chlorinated benzenes, total phthalates, etc. These maps should be constructed similarly to those constructed for total VOCs, PCBs, and lead.
120. Section 5, Page 4, Paragraph 1 - Were any of the compounds detected in the various media but not listed in the working groups significant contaminants with distinctive properties? If so, they should be mentioned here and discussed in the appropriate places in the rest of the section.
121. Section 5, Page 5, Paragraph 4 - Were any comparisons done with the other metals with respect to lead? If not, then what justification is used for making lead the indicator of the distribution of the TAL metals other than chromium? Please expand.
122. Section 5, Page 6, Paragraph 4 - What criteria are being used to evaluate the biochemical decomposition rates of the landfill. Why is biochemical decomposition more active in the newer area of the landfill? Please expand.

123. Section 5, Page 7, Paragraph 1 - It should be mentioned in this discussion that at least part of the BTEX compounds found in the leachate wells could come from the off-site containment area. Phenols and ketones were also found in the leachate samples in as significant of levels as the BTEX compounds. This should be mentioned in the discussion as well.
124. Section 5, Page 7, Paragraph 2 - Discussion is uninformative because vague references to higher values are provided instead of actual quantities. Define what "high" means: Double background, 10 times, 20 times? The discussion should relate the relative terms to the indicator TAL metal (lead).
125. Section 5, Page 7, Paragraph 5 - The text should add that sediment samples for TOC analysis were collected in Phase III, for purposes of the Ecological Assessment.
126. Section 5, Page 8, Wetlands West of ACS - Sediment samples SD-03 and SD-16 are located in the apparent former drainage ditch from ACS that is visible in 1970 aerial photograph. A discussion associating and clarifying these sediment samples with the previously existing drainage should be added. At the beginning of Sentence 3 insert the following: *SD03 is located at a former drainage ditch location (1970 aerial photograph, Appendix A), and SD16 is located ... ACS facility.* Following the end of the revised sentence insert the following sentence: *This drainage ditch and settling point appeared to drain the Still Bottoms/Treatment Lagoon area in the 1970 aerial photograph and the contaminant groups detected in these samples may have originated from this drainage.*
127. Section 5, Page 8, (second set) Bullet 5 - The text should address the possibility that the presence of PAHs, phthalates and ketones in the wetland area west of the landfill could be attributed to past drainage of the Kapica area and the Off-site Containment Area. This should be mentioned in the text.
128. Section 5, Page 8, Bullets 8 through 12 - Discussion is uninformative because vague references to low or high values are provided instead of actual quantities. The discussion should define "low", i.e., less than 10 ppb or 100 ppb, etc., or give ranges of concentration. Please elaborate.
129. Section 5, Page 9, Bullet 2 - The presence of PAHs in the drainage ditch is more likely the result of leachate from the disposal of incinerator ash in the Off-site Containment Area, rather than run-off from the adjacent railroad. It is known that ACS used the Off-site Containment Area as their prime

disposal location for incinerator ash. This should be incorporated into the discussion in the text.

130. Section 5.4 (General) - The total volume calculated in each of the areas should be modified to include the total volume of soil and wastes containing greater than 50 ppm lead. Also, the volumes of the SVOC and TBNA groupings should be calculated and reported for each area.
131. Section 5, Page 10, Paragraph 1 - This comment is appropriate for the discussion which begins at this point in the document. Overlays should be constructed of the major SVOC and TBNA groups found in the waste and soils at the site. A similar comment was previously mentioned in comment 119 above.
132. Section 5, Page 10, Bullet 2 - The second sentence states that contaminants at this sampling location may have originated from the commercial establishments along Reder Road. In order to justify this statement, background information regarding hazardous material use along Reder Road should be added here, or the location of this information elsewhere in the report should be referenced.
133. Section 5, Page 10, Paragraph 3 - To what stratigraphic depth do the overlays examine the contamination? To the top of the clay underlying the first aquifer? This depth is not stated clearly in the text. Please clarify.
134. Section 5, Page 11, Paragraph 1 - To obtain a better visual representation of the metal (i.e., Pb) contamination at the site, it is requested that in addition to the 500 ppm contour, a 50 ppm contour line be created for the Pb concentration overlays. This may provide a better visualization of the burial of wastes at the site, and aid to some degree in the evaluation of some alternatives, for example biological treatment of buried wastes and soils.
135. Section 5, Page 12, Paragraph 1 - The buried drums were located in the northwestern portion of the On-Site Containment Area, but this fact is not made clear in the text. To remedy this, replace Sentence 3 with: *The buried drums are found in an area approximately 50 feet by 50 feet in the northwestern portion of the On-Site Containment Area, and appeared to be stacked three high in the test pit excavations. Their exact location is shown in Figure 1-2.*
136. Section 5, Page 12, Paragraph 1 - There appears to be two distinct areas of VOC and PCB contamination in the On-Site

Containment Area. The first is the drum burial area, and the second is the southeast area of the On-Site Containment Area centered around soil borings SB-55, SB-57, and SB-60. This pattern seems to imply two sources of contamination for the On-Site Containment Area. This pattern was addressed in the text (Section 4.1.1) when discussing VOCs but no mention was made of possible sources. The text states only that the drums are possibly the major source of potential contaminants. This should be qualified. To account for this, replace the last sentence with: *It is possible that the drums represent a major source of potential contaminants in this area, although the soil sample analyses indicate several areas of soil contamination throughout the On-Site Containment Area.*"

137. Section 5, Page 19, Paragraph 5 - The first sentence is incomplete. Please correct the text to indicate where the chromium and lead were detected.
138. Section 5, Page 19, Paragraph 6 - The text does not indicate that this area was a former drainage ditch as indicated by the 1970 aerial photograph. This is a plausible explanation for the source of these contaminants. To account for this, insert after Sentence 1: *Review of the 1970 aerial photograph indicated this area was a former drainage ditch which has since been filled.*
139. Section 5, Page 21, Paragraph 1, Line 2 - The sample identification *SW01* should be changed to *WS01*, since it refers to a waste sample and not a surface water sample.
140. Section 5, Page 21, Paragraph 2, Line 4 - The word *waste* should be changed to *west*.
141. Section 5, Page 21, Paragraph 4 - As stated previously in comments on Section 3.4.5.2, a detailed discussion of the relationship between the buried chemical waste from ACS in the Off-Site Containment Area and the garbage disposed by Griffith Landfill should be presented. The soil borings and auger probes on the western edge of the Off-Site Containment Area indicate that these boundaries are very close if not overlapping. Auger probes AP-63 to AP-71 and soil borings SB-40 to SB-42 encountered the overlapping conditions. Some clarification on one of the figures (perhaps Figure 1-2) would also be appropriate.
142. Section 5, Page 21 - One flaw of discussion using the 1 ppm VOC and PCB criterion for plume delineation is that the point where detectable contamination ends or begins (i.e., the area

that appears to be unaffected by the contaminants) has not been identified. This is addressed partly in the northern areas by the Tracer work identifying the extent of the organic plume in the groundwater. However the Tracer study did not extend to the Griffith Landfill, Off-Site Containment Area, and the Kapica Drum area. This flaw should be addressed in each section of the text.

143. Section 5, Page 24, Paragraph 1, Line 4 - Following 100 yd<sup>3</sup>, insert the word occur.
144. Section 5, Page 28, Paragraph 4 - The discussion here should be updated to include the findings of Phase III.
145. Section 5, Page 29, Paragraph 1 - What appears to be the sources of the two upper aquifer organic contaminant plumes? Do they match the waste disposal areas? This is not made clear in the text.
146. Section 5, Page 29, Paragraph 1 - The maps of the groundwater plume needs to be updated to reflect the results found in Phase III. The map provided in the Phase III submittal to USEPA should suffice.
147. Section 5, Page 32, Bullet 1 - The disqualification, through the validation process, of methylene chloride from a large number of samples needs to be further justified. Examples should be provided in the text to demonstrate how those samples containing methylene chloride and subsequently disqualified were eliminated from further consideration. This is of concern since methylene chloride exists at the site and was a major production compound used and refined by ACS.
148. Section 5, Page 33, Bullets - Discussion would be clearer in bullets if the probable source of each detection of the inorganic constituent is stated, such as was generally mentioned for wells MW-03, MW-04, and MW-06 in Page 33, Paragraph 3.
149. Section 5, Page 35, Paragraph 1 - The discussion and listing of data results, through Section 5.5.2.2, should be updated to include the results from Phase III sampling and well placement.
150. Section 5, Page 35, Paragraph 2 - The text states that considerable attenuation is occurring downgradient of MW09. This is based upon the existence of significantly lower concentrations of contaminants at MW10. The lower

concentrations of contaminants at MW10 also could be the result of dispersive and advective processes occurring in the lower aquifer. If attenuation were assumed then it is reasonable to assume that the contaminant plume is very near MW10, and at the concentrations found in MW09.

151. Section 5, Page 37, Paragraph 1 - This statement should be expanded. Why is the leachate from the landfill a possible contributor to the lower aquifer contamination?
152. Section 6, Page 2, Paragraph 3 - Please list in the text the assumed bulk density value,  $\rho$ , used in the calculations. It could not be located anywhere in the report.
153. Section 6, Page 11, Paragraph 4, Line 3 - The title: *Off-Site Contaminant Area*, should be changed to the *Off-Site Containment Area*. This error also occurs in the following paragraph.
154. Section 7.1.1, Page 3, Paragraph 4 - The Griffith Municipal Landfill should be included as an operable area in this discussion. This would increase the number of operable areas to nine. It should also be listed in the bullets following the paragraph.
155. Section 7.1.3, Page 8, Paragraph 4, Line 4 - Following the word *not*, insert the word *generally*. Also, insert at the end of the sentence on Line 4, the following: *, but were known to be used as drinking water supply wells as recently as five years ago by some area residents.*
156. Section 7.1.3, Page 9, Paragraph 4 - The identification of the nearest residences to the site should be placed at the beginning of the paragraph, and afforded more detail than provided in the document currently.
157. Section 7.1.3, Page 10, Paragraph 1 - If available, please use the 1990 census tracts in the discussion of demographics.
158. Section 7.1.3, Page 11, Paragraph 3 - Following the word *physical*, insert the phrase *and chemical*.
159. Section 7.1.3, Page 13, *On-Site Workers at the ACS Facility* - Two bullets should be added here to the list of exposure pathways: *Incidental dermal contact with surface water*, and *Exposure to lower aquifer groundwater by ingestion*. These two pathways should either be included, or their exclusion justified in the text. It is not verified in the text that



ACS uses the lower aquifer groundwater exclusively for industrial purposes. Also, there are numerous surface water features located on the site that site workers could potentially be exposed to during normal working hours, depending upon their positions.

160. Section 7.1.3, Page 14, Paragraph 1 - The discussion presented here is completely misleading. The Baseline Risk Assessment assumes the "no action" alternative - that is, the risks to human health which may occur at any time in the future if U.S.EPA does not require some remediation of the site. The basis of the risk assessment, is the current land use (not the most current monitoring results which in some instances may be several years old). The current land use takes into account that given the present use of residential wells as a drinking water source, ingestion of contaminants in the lower aquifer may occur at any time....next month, next year, in ten years, or may have already occurred since the last sampling data was collected. Likewise, the current land use takes into account that there are residents and workers employed in the area who have access now and will have access in the future to contaminated areas of the site. This access may actually increase in future years, as it cannot be assumed that ACS will own the site in the future or that land access will be restricted. The future land use scenario presents the more conservative approach, as it assumes that the land may become inhabited at some time in the future, even if only by a few residents in mobile homes with private wells. The paragraph should be rewritten, incorporating this discussion.
161. Section 7.1.3, Page 14, Paragraph 1 - It is not true that groundwater contamination is confined to the site for both of the aquifers. There is some uncertainty regarding the extent of the upper aquifer plume in the northern portions of the site. Also, in the eastern portions of the site, the groundwater plume has progressed off-site and would currently threaten any upper aquifer wells located near this area. The assumptions made here in the text should be qualified or eliminated in view of these uncertainties.
162. Section 7.1.3, Page 14, Paragraph 2 - The upper aquifer is a potable source of drinking water in some locations, and was in use as a drinking water source for some area residents as recently as five years ago. Those residents who used the aquifer report that they discontinued use of the aquifer when informed of recent environmental activities in the area. To account for this, the following sentence should be added to the text following the sentence ending on Line 8: *However,*

*some persons reportedly had used the upper aquifer for drinking water purposes as recently as five years ago.*

163. Section 7.1.3, Page 15, Paragraph 2 - There is not sufficient data to make the claim that the wetlands west of the ACS facility are acting as "cleansing mechanisms" for upper aquifer groundwater. The only wetland groundwater data available is from MW13 which contains hazardous organic substances. The remaining portions of the wetlands are currently without groundwater data to verify this hypothesis. For purposes of the risk assessment, this type of natural attenuation should not be assumed without sufficient data to back it.
164. Section 7.1.3, Page 16, 2nd Paragraph - The confining clay layer between the upper and lower aquifers is reported to be only 2.5 ft deep in some areas of the site; this weakens the plausibility of the argument for substantial retardation of contaminant migration downward due to this confining layer. In addition, contaminant concentrations are already elevated in the lower aquifer, suggesting that future exposure is likely given the current land use. Discuss these apparent discrepancies here.
165. Section 7.1.3, Page 16, Paragraph 4 - VOCs in subsurface soil are not usually considered to be an air threat unless the subsurface soil is exposed - as in a future land use. Only VOCs in surface soil need be considered in the current land use scenario, especially given the that the surface soil layer is defined as the top 3 feet.
166. Section 7.1.3, Page 17, Paragraph 3 - The justification for not taking air samples during the RI, is not supported with evidence in the risk assessment. Upwind and site samples could have been taken. Real-time VOC monitoring could have been performed to determine if any high levels of VOCs were being emitted. This could have confirmed the presence of VOCs or shown that this is not a significant source. This would have reduced the overall uncertainty of the risk assessment.
167. Section 7.1.3, Page 17, Paragraph 3 - The term *heavy industry* is questionable in the discussion at this point. The land use discussion at the beginning of the text describes the area as a light industrial, agricultural and residential area. Heavy industry does exist in the area but at a sufficient distance from the site. Generally, the facility is the only heavy industrial facility in the area, the remaining industry being mainly non-manufacturing service-oriented businesses.

168. Section 7.1.3, Page 18, Paragraph 6 - The Baseline Risk Assessment addresses potential current land use exposures, not current observations. Correct this discussion.
169. Section 7.1.3, Page 19, Paragraph 2 - The paragraph should begin with the following: *Portions of the*, and following the word *groundwater* insert the word *table*.
170. Section 7.1.3, Page 19, Paragraph 3 - The possibility that hunting and gathering activities may take place in the wetlands should be mentioned in the discussion, and a determination should be made whether or not such activity would pose a significant risk to that portion of the population that may hunt or gather from the area.
171. Section 7.1.3, Page 21, Paragraph 2 - Would anyone really sink a drinking water in the upper aquifer if it is not classified for potable use? This seems very unlikely.
172. Section 7.1.3, Page 21, Bullets - An additional bullet should be added to the list of pathways to account for the inhalation of volatiles and semi-volatiles released into homes based on-site through foundations and basement walls.
173. Section 7.1.3, Page 21, Paragraph 2 - The likelihood of someone using the upper aquifer groundwater on-site in the future is not as minuscule as the text would assume. Knowledge of the existence of contaminated groundwater is not guaranteed for future users of the upper aquifer. Also, the upper aquifer was used as a potable drinking water source in some areas, and was used as recently as 3 years prior to the onset of RI activities at the site. The main reason residents discontinued use was due to fears that the aquifer may have been contaminated due to the recent reports of environmental activity in the area.
174. Section 7.1.3, Page 22, Paragraph 3 - Exposure to subsurface soils through excavation and residential construction are hypothesized. It is termed "highly unlikely." This type of event should include some type of dilution of soil contaminants. It is extremely conservative to assume soils will be excavated and remain at the highest levels. In addition to mixing with uncontaminated soils, volatilization, and other processes will reduce contamination over time.
175. Section 7.1.3, Page 22 Paragraph 3 - The inhalation of vapors emanating from the basements and foundations of future on-site

homes is another important pathway to consider in the future scenario.

176. Section 7.1.3, Page 23, Paragraph 1 - Please support the assumption made with regard to the future use of site wetlands and drainage ways, i.e., why are they assumed to remain unchanged?
177. Section 7.1.3, Page 23, Paragraph 4 - It should be added here that VOCs could be released into homes through the foundation and would tend to concentrate, and increasing exposure time and concentration.
178. Section 7.1.3, Page 26, Paragraph 6 - RAGS (U.S.EPA, 1989) allows the use of the permeability constant (PC) of water to derive default values when chemical-specific values are not available. The document gives the outdated (1984) PC of water as  $8.4 \times 10^{-4}$  cm/hr. You were provided with specific instructions that the PC of water should only be used for metals and inorganics and with guidance from ECAO. The latter allows for the updated PC of water ( $1.5 \times 10^{-3}$  cm/hr) to be used for inorganics and the updated PC for toluene 1.01 cm/hr) to be used as a default value for volatile organics when toluene is present. The PC for 2-butanone can be used for semivolatile organics when this compound is present. The use of the PC for water is never appropriate for these organic compounds. These values will have to be changed in Table 7-17 and in the calculations. The use of the correct PCs in this risk assessment will significantly change the conclusion section.
179. Section 7.1.3, Page 26, Paragraph 4 - It is mentioned that incidental ingestion would occur at rates of 0.05 l/hr and 0.005 l/hr for swimming and playing near wetlands respectively. Please indicate the time period, i.e., in terms of hours per day that this is assumed to occur.
180. Section 7.1.3, Page 27, Paragraph 1 - The approach taken here for the estimation of the inhalation exposure to VOCs released from drinking water is not very quantitative. The approach presented as Exhibit 6-16 in RAGS, page 6-44, is better and should be used for this exposure pathway.
181. Section 7.1.3, Page 28, Paragraph 4 - The use of the term "mean" implies that the arithmetic mean, as suggested in RAGS, was used. This is not the case as the statistic used in this risk assessment was a modified geometric mean. This requires

some explanation as to why the arithmetic mean was not used. See also the comments on Appendix U, page 3.

182. Section 7.1.3, Page 29, Paragraph 2 - The use of the UCLM value for contaminants in groundwater is not appropriate. Residents are exposed to a single contaminant concentration, not an average of the entire aquifer. See also comments for Appendix U, page 1.
183. Section 7.1.4, Page 31, Paragraph 1 - *"Although the chemicals have been divided into carcinogens or noncarcinogens, some chemicals are in both groups."* As it is written, this sentence is unclear. We assume that the authors wish to state that some chemicals have been evaluated as having the potential to cause both carcinogenic and noncarcinogenic effects.
184. Section 7.1.5, Page 35, Paragraph 3 - Another operable area should be added to include the Griffith Municipal Landfill portion of the site.
185. Section 7.1.5.3.1, (Summaries) - The discussions addressing the noncarcinogenic risks as expressed by the individual hazard quotients (HQs) or additive Hazard Indices (HI) is incorrect. A  $HQ > 1.0$  for a specific contaminant indicates a likelihood of the adverse health effect due to exposure to that chemical. When the HQs for several contaminants give an additive  $HI > 1.0$ , the HQs must be regrouped according to target organ effect or mechanism of action. If the HI for all chemicals having the same target organ effect is  $> 1.0$ , there is a likelihood of the effect. All pathways should be considered in the summation. Review "Segregation of Hazard Indices", page 8-14, RAGS, for additional guidance on this point.
186. Section 7.1.5, Page 36, Paragraph 2 - As noted previously, this discussion is totally incorrect. Health risks in the Baseline Risk Assessment are based on current land use not "current monitoring conditions". Correct this discussion, incorporating the comments in response #1 above.
187. Section 7.1.5, Page 36, last sentence Please add that the MCL value for arsenic assumes that drinking water is the only route of exposure to arsenic and that arsenic is the only chemical of concern. Because the "single chemical, single source" rationale does not apply at most Superfund sites, comparison with the MCL is not very relevant.

188. Section 7.1.5, Page 37, Paragraph 1 - Children should be included in the lower aquifer exposure scenario since it is likely that they would be bathing in and drinking the same water as the adults with whom they live.
189. Section 7.1.5, Page 37, Paragraph 1 - Why are the risks to the upper and lower aquifers only considered nonconcurrently? Can you be certain that children who use swimming pools filled with water from the upper aquifer never drink water from the lower aquifer? Please explain the rationale used here. Also, don't these children also breathe the same air as the resident adults? Don't trespassing children also have off-site exposures? These subpopulations of children are likely to have exposure to the same chemicals from several pathways, and these exposures should be summed to allow assess of the total risk to the MEI (Maximally Exposed Individuals or Populations). Therefore, exposures should always be considered from the target population viewpoint as well as the medium viewpoint. The number of subpopulations addressed in the risk assessment can be reduced to the most sensitive groups; the 30 year (adult exposure) should assume exposure as a child plus exposure for the remaining years as an adult if reasonable. This approach also applies to the future scenario.
190. Section 7.1.5, Page 37, Paragraph 2 - This is a totally erroneous conclusion. The risk is not due to 2-butanone. The PC for water is never appropriate for organic chemicals; this error has lead to the naive conclusions presented here. Refer also to comment #6 above. The entire summary section (7.1.5.3.1) will have to be rewritten to reflect the conclusion from the corrected calculations.
191. Section 7.1.5, Page 41, Paragraph 2 - The Griffith Municipal Landfill should be added to the list of areas under consideration.
192. Section 7.1.5, Page 41, Paragraph 5 - ". . . contaminated groundwater in the upper aquifer was estimated to be  $2.4 \times 10^{+3}$  (Table 7-38)." The HI for the upper aquifer is  $2.6 \times 10^{+3}$  as listed in Table 7-31. This value should be corrected here and in Summary Table 7-38.
193. Section 7.1.5, Page 42, Paragraph 4 - The discussion concerning the assignment of HI values to the various operable areas at the site, needs to include calculations on the Griffith Municipal Landfill and a discussion of same.

194. Section 7.1.5, Page 42, Paragraph 1 - "Other than 2-butanone, none of the other chemicals of potential concern have a HQ greater than 1." This statement refers to contaminants in the upper aquifer. In addition to 2-butanone, acetone and 4-methyl-2-pentanone have HQ>1 (Table 7-31).
195. Section 7.1.5, Page 44, Sub-bullet 3 - "Barium is the only other chemical (metal) of potential concern with a HI greater than 1 (1.1) (Table 7-37)." This statement should be eliminated. Barium has an HI of 0.79 in Table 7-37.
196. Section 7.1.5, Page 45, Paragraph 3 - The discussion concerning the assignment of cancer risk estimates to the various areas, needs to include a calculation of the cancer risk posed by the Griffith Municipal Landfill and a discussion of same.
197. Section 7.1.5, Page 47, Paragraph 2 - It is not true that groundwater contamination is known to be contained within the site boundaries and has not progressed off-site. The area to the southeast of the site does have groundwater contamination which could possibly be affecting upper aquifer wells in this area. Also, there is no data to substantiate this claim in the north and north western area of the site since no groundwater samples were taken north of the railroad tracks or in the wetlands west of the ACS facility. These uncertainties should be mentioned in the listing of assumptions concerning current risks at the site and a reevaluation of the assumed "highly" conservative nature of the assumptions should be completed.
198. Section 7.1.5, Page 48, Bullet 3 - Are published toxicity values an appropriate uncertainty in the risk assessment process?
199. Section 7.1.5, Page 48, Bullet 6 - The assumption that use of the upper aquifer groundwater for drinking water purposes is conservative and likely overestimate[s] risk is not a valid assumption. It is known that residents in the area of the site did in fact use the upper aquifer for drinking water purposes as recently as five years ago. These residents only discontinued use after they were informed of potential problems with the quality of their water following site listing.
200. Section 7.1.5, Page 48, Bullet 9 - Assuming "no corrective action/no restrictions/no development" does not tend to elevate (overestimate) the Site risks; rather it is the basis

of the risk calculation. Obviously, if the site had been remediated, we would not need to do a Baseline Risk Assessment to evaluate risks from current or future land use. This bullet is misleading and should be deleted.

201. Section 7.2, Page 50

**General Comments**

This ecological assessment is a qualitative assessment of the actual or potential ecological impacts of the site. If a qualitative ecological assessment is the objective of the work plan, this task has been completed.

One major problem found in the report was the inconsistency in measurement units (e.g., milligrams versus micrograms). Because of this, inappropriate conclusions are drawn in the report. In addition, the conceptual model describing potential ecological exposure pathways is incomplete and needs to be expanded. Conclusions cannot be drawn concerning the potential ecological impact of the site until sediment quality criteria are obtained, and other corrections are made.

202. Section 7.2, Page 50 - Other manuals are available for guidance on ecological assessments, though not as recent as the *Risk Assessment Guidance for Superfund - Volume II - Environmental Manual* (U.S. EPA, 1989), including:

- U.S. EPA. 1986. *Ecological Risk Assessment*. Office of Pesticides Program. Washington, D.C. EPA-540/9-85-001.
- U.S. EPA. 1989. *Ecological Assessment of Hazardous Waste Sites. A Field and Laboratory Reference*. Environmental Research Laboratory. Corvallis, Oregon. EPA/600/3-89/013.
- Oak Ridge National Laboratory. 1986. *User's Manual for Ecological Risk Assessment*. Eds. L.W. Barnhouse and G.W. Suter II. Prepared for U.S. EPA, Interagency Agreement No. DW8993 0292-01-0.

203. Section 7.2.1, Page 51 - Future site ecological risks should be assessed as well.

204. Section 7.2.2, Page 52, Paragraph 2, Line 4 - Should use lower case "s" for the word *Sites*.



205. Section 7.2.2, Page 52, Paragraph 3, Last Sentence - This sentence is unclear; it would be more understandable as: **Assessments of risks to ecological resources based on future site use will vary with the feasibility study alternatives and will be addressed in a discussion of those alternatives.**
206. Section 7.2.3, Page 53, Sentence 2 - This sentence is unclear; it would be more understandable as: **This 130-acre area contains primarily upland and wetland habitats.**
207. Section 7.2.3, Page 53, Paragraph 3 - The flow pattern onto the site can only be inferred, since no data exists to substantiate the claim that the wetland areas and surface water north of the site, drains into the Wetland I. Since the ACS site acts as a groundwater recharge area and causes a substantial groundwater mound, it is entirely possible that groundwater flow could be trending in a northerly direction with respect to the site.
208. Section 7.2.3, Page 54, Paragraph 3 - Are these wetlands recharge areas? Discharge areas? This information is needed to understand the importance of these wetland habitats, since true risk is based on the impairment of function. On line 3, **wetland I** is a proper name and should be capitalized and referred to as **Wetland I**.
209. Section 7.2.3, Page 54, Paragraph 5, Line 1 - **Typha sp.** should be **Typha spp.**
210. Section 7.2.3, Page 55, Paragraph 1 - To be consistent with the generic species term used throughout text, it may be more appropriate to use **Populus spp.** and **Rhus spp.** when referring to the genera.
211. Section 7.2.3, Page 55, Paragraph 3 - The title of the paragraph should read: **Habitat of Surrounding Areas."**

Several questions arise when reading this section, including:

- 1) Can "the standing water bodies" in the areas surrounding the site be impacted by the site in any way, e.g., from contaminated groundwater?
- 2) Aren't the wetlands east of the ACS plant a "surrounding habitat"? They're not mentioned in this section.
- 3) What about Turkey Creek? Does the site have any potential impact on this surface water feature? Section

4.4.1 suggested that Turkey Creek may provide some drainage of the wetland.

212. Section 7.2.4, Page 56, Paragraph 3 - *"Tentatively identified compounds are not considered further due to lack of information regarding them."* This statement does not give strong support to the elimination of the TICS as contaminants of concern. Further description on the type of information lacking, e.g., toxicological, is needed. Also, listing the TICS in a table by media sampled would be more useful than a generic list of TICS. This helps the reader to draw the same conclusions as the author.
213. Section 7.2.4, Page 56, Paragraph 1 - It has been generally stated throughout the RI report and the human health risk assessment that upper aquifer groundwater discharges to site wetlands. The only exception to this assumption occurs in the ecological assessment. For purposes of the ecological assessment the surface water contaminant levels should be assumed to be equivalent to the groundwater levels found under the site.
214. Section 7.2.5, Page 57 - LC<sub>50</sub> values were less than 1,000 times greater than concentrations found in surface waters for these additional compounds:
- Xylene (approximately 0.01 LC<sub>50</sub> values - bluegill)
  - Phenol (approximately 0.01 LC<sub>50</sub> values - bluegill, fathead minnow)
  - 2,4-Dimethylphenol (approximately 0.01 LC<sub>50</sub> values - bluegill)

In addition, LC<sub>50</sub> values are given for the inorganic elements, but no comparison was made. Those inorganics below 1,000 times the LC<sub>50</sub> for certain species were:

- Arsenic (approximately 0.01 LC<sub>50</sub> values - bluegill, fathead minnow)
- Beryllium (approximately 0.01 LC<sub>50</sub> values - bluegill)
- Lead (approximately 0.01 LC<sub>50</sub> values - fathead minnow)

These changes may be due to use of inconsistent units.

215. Section 7.2.7, Page 59, Paragraph 1 - While toxicological information is not available for terrestrial species, a qualitative comparison between the LD<sub>50</sub> values for rats can be used as a means of comparison. For example, the method described in Urban and Cook, 1986. (Hazard Evaluation

Division Standard Evaluation Procedure: Ecological Risk Assessment. EPA 500 19-85-001.)

216. Section 7.2.7, Page 59, Paragraph 2 - Only three metals exceeded the Ambient Water Quality Criteria (chromium, iron, and lead), and not the reported seven. This change may be due to the inconsistent units presented in the tables.
217. Section 7.2.7.2, Pages 59-60 - No reference is provided for the equation used to calculate sediment quality criteria.
218. Section 7.2.7, Page 61, Paragraph 2 - Do contaminants from the site pose any actual or potential threats to the Hoosier State Prairie Nature Preserve? For example, are there any wetlands in the preserve that may be impacted from contaminated groundwater? What about Turkey Creek? Does this creek have any significant areas that could be impacted?
219. Section 7.2.7, Page 61, Paragraph 2 - The conclusion that endangered species or threatened species do not exist at the site, based upon a cursory review of the site during a May 1990 visit is not valid unless a species count etc. or something were completed.
220. Section 7.2.8, Page 62, Paragraph 2 - Not all metals in the sediments were below the background soil levels. When compared to Table 5-1, these metals in the sediments were found at elevated levels:  
  
Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium and Thallium  
  
This difference may be due to the use of inconsistent units when comparing the results. Also, not all materials called "sediments" are sediments. For example, the soils in the wetlands are soils, not sediments. Also, it may be useful to restate in the summary section that future ecological risks will be described in the feasibility study.
221. Section 7.2.8, Page 62, Paragraph 2 - What about the effects of these contaminants on waterfowl, song birds and small mammals who reside in the wetland area? They should be assessed as well.
222. Section 7, References - When an author has more than one reference, the references should be placed in chronological order and given a letter if more than one reference was

published in the same year (e.g., U.S. EPA, 1989a). This citation system must also be used consistently in the text.

223. Section 7, References, Page 64 - The following correction should be made in the references: SPHEM should replace SEAM.
224. Section 8 -Please include Section 8 in the revised document. It is expected that this section will be in the form of a short summary and will arrive in a general sense to the conclusions previously drawn in this version of the document and will incorporate all of the corrections required in these comments.

## TABLES

225. Table 7-1 - This table is rather useless unless the contaminant names are cross-referenced to the ACS # in another table. Wouldn't it be more helpful to the reader to list the chemicals directly by name?
226. Tables 7-2 through 7-10 - Notes at the end of these tables indicate that results of metal analysis are reported to three significant digits, while organic analysis results are accurate to two significant digits. Reporting chemicals concentrations in up to 9 significant digits implies an accuracy which is not possible. Correct all reported values to either two or three significant digits as appropriate. Also, what is meant by the "mean" in these tables? An arithmetic mean should be reported; one-half of the Sample Quantitation Limit (SQL) should be used for zero values. A "mean" of 4.00, given 2/24 detects at concentrations of 1.00 and 7.00 is impossible, and implies that such an erroneous value was used in the risk calculations. Please correct these tables to show the actual mean concentration values used in the calculations.
227. Tables 7-2 to 7-10 - The type of mean value listed should be indicated (arithmetic, geometric).
228. Table 7-12 Page 2 - Vinyl cyclohexane , should be vinyl cyclohexane.
229. Table 7-15, Page 4 - The first two exposure routes on this page are duplicates. The second should probably refer to the upper aquifer.
230. Table 7-17 - The use of NA (not available) for RfDs and SFs which are not available will make this table easier to read.

Many of the toxicity values listed differ from those in IRIS and HEAST. Recheck your toxicity values and list the reference for each value to allow verification. Correct the Permeability Constants. The slope factor units are usually given as  $(\text{mg/kg-d})^{-1}$ . Change on page 35 also.

231. Table 7-17 - 1,2,4-Trichlorophenol, listed in the semivolatiles, should be 1,2,4-trichlorobenzene. The oral RfD is  $1.31\text{E-}3$  mg/kg/day, and the inhalation RfD is  $3\text{E-}3$  mg/kg/day (HEAST, 4th quarter 1990). The oral RfD for manganese is  $1\text{E-}1$  mg/kg/day, and the inhalation RfC is  $4\text{E-}4$  mg/cu.m. (IRIS, 12/01/90).

Additional Comments on Table 7-17

A tremendous amount of information has been organized into this table. Presenting the information in this compact form has eliminated identification of reference sources for each health criterion. Although there is a footnote indicating that all values were obtained from IRIS, HEAST, or approved by ECAO, there are instances when more explicit source referencing might prove useful to the risk manager.

For example, a value that plays an important role in the overall site risk is the dermal absorption coefficient for 2-butanone. As mentioned several times in the text, its dermal absorption coefficient is several orders of magnitude greater than most other contaminants. This increased dermal absorption leads directly to increased overall calculated site risk. Without identifying the source for this number, it is impossible to evaluate the uncertainty associated with it.

232. Table 7-18 - The following chemicals should be listed as belonging to cancer risk group B2: 2,6-dinitrotoluene; 2,4-dinitrotoluene; benz(a)anthracene; chrysene; bis(2-ethylhexyl)phthalate; benzo(b)fluoranthene; benzo(k)fluoranthene; indeno(1,2,3-cd)pyrene; dibenz(a,h)anthracene; dieldrin; and lead. Butylbenzylphthalate and beta-BHC should be listed as belonging to cancer risk group C. Nickel should be listed as belonging to cancer risk group A for the inhalation exposure route.
233. Table 7-38 - Resumm risks to identified sensitive target populations (MEIs), including all reasonable pathways. For further guidance, see section 8.3.1, page 8-15, RAGS.

234. Table 7-38 - Under the cancer risks columns, dermal is misplaced in the column headings. It is placed above inhalation and should be above absorption.
235. Table 7-39 - 2,4-Dichlorophenol (2,4-DCP) is not included in the contaminant list, but 2,4-DCP is included in Table 7-40 and 7-41. Was this compound not found in the surface water, soil, or sediments?

Additionally:

*Berllium* should be *Beryllium*.

*Terralium* should be *Thallium*.

The units for sediment and off-site shallow soil are incorrect. The column heading should read mg/kg not  $\mu\text{g/kg}$ . Table 5-1 is referenced incorrectly in footnote (1); the reference should be to Table 5-3.

236. Table 7-40 - Since toxicological data is not available for all contaminants, for consistency sake, it would be helpful to list the compound. This was done in Table 7-24 Also units for  $\text{LC}_{50}$  and  $\text{LD}_{50}$  are not the same as those used in Table 7-39 to describe the contaminant concentrations; for comparison sake, this would be helpful.
237. Table 7-42 - Units for criteria differ from units given in data Table 7-39. Similar units make comparison easier.
238. Table 7-41 - The headings are not lined up correctly. Additionally, this conceptual model is incomplete. Additional routes of contaminant pathways should be included as well as exposed populations. Exposure potential for biomagnification routes do not apply to those routes.

## FIGURES

239. Figure 2-6 - The area between GW6 and GW4 (east of Colfax Drive) was not sampled by Tracer. Therefore using only Tracer data resulted in a large gap between sampling points. This gap should be dashed to show the plume boundary is inferred. If monitoring well data (from MW-7 and MW-12) were used to substantiate this line, then these sampling points should be placed on the figure and the figure should be renamed.

240. Figure 4-1 shows sand and gravel units interconnecting between the Calumet Aquifer and the Valparaiso Aquifer in the area of the ACS Site, hence indicating that there is no clay confining layer in this area. This figure does not agree with the text (Page 2, Paragraph 5). Also, this figure should have a vertical scale. To remedy this, at Page 2, Paragraph 5, insert after Sentence 5: *Previous investigations have indicated that the clay confining layer may not be continuous in the region around the ACS site, and may pinch out to the south (Hartke et al., 1975, Figure 15). However the degree of interconnection between the Calumet Aquifer and Valparaiso Aquifer near the ACS site, if any, was not determined by previous investigations.* Move the third sentence to the end of the paragraph: *These units are ... Glacial Geology.*
241. Figure 4-12 - Show by use of flowlines, the surface water flow directions onto and off of the site.
242. Figure 7-2 - Location of site would be helpful on this map. Also, the location of the off-site drum containment area is not shown on this map.

## APPENDICES

243. Appendix C, The figure entitled "Draft Contour Map of Total Field Magnetic Values (gammas)" should be renamed because it presents the gradient of the total magnetic field - not the total magnetic field. SUGGESTED CHANGE, "Contour of the Magnetic Gradient over the On-Site Containment." General Comment - The data interpretations for the magnetic data have not been presented. Please provide.
244. Appendix C - The titles of EM figures in Appendix C should identify which induced magnetic component was measured, e.g., "Contour Map of Low Quadrature Values." The titles for EM data tables should also identify which induced magnetic component was measured. Why are data not shown for the On-Site EM Survey and the Still Bottoms Area Survey? Please provide these data.
245. Appendix D - Comparison with WESTON's field notes found no major discrepancies in the soil boring logs, only minor differences in descriptions of subsurface materials.
246. Appendix H - Comparison with WESTON's field notes found no major discrepancies in the test pit logs, only minor differences in descriptions of subsurface materials.

247. Appendix J - Three discrepancies were found in values recorded from the Tracer Research Corporation (Tracer) samples. WESTON recorded that sample GW1 at 11 feet contained 93 ug/l toluene, while the RI report listed 94 ug/l. WESTON recorded that sample GW2 at 14 feet contained 600 ug/l xylene, while the RI report listed 540 ug/l. WESTON recorded that sample GW6 at 10 feet contained 0.7 ug/l THC, while the RI report listed 0.8 ug/l. Warzyn's field notes and Tracer's field notes should be examined to determine the correct values.
248. Appendix S, Page 2, Line 2 - Surface soil is usually considered to consist of the top 6 inches, not the top 3 feet. Explain this deviation. Does this apply to all soil samples or only those from the Kapica-Pazmey area? Also explain in Appendix U, page 1.
249. Table S-1 - Do not generate accuracy through computation. Concentration values should be reported to 2 or 3 significant digits as appropriate.
250. Appendix T - The assumptions used in each exposure pathway are presented here. The key problem is that exposure which is described as unlikely in the text is treated as if it clearly occurs on a regular basis. The exposures should be looked at more realistically to comply with the RME approach. Listed below are some specific examples:

Table T-3

- EF - 182 days per year for an off-site resident

Table T-4 and T-5

- ET - child swims 2.6 hours per day
- EF - 2 days/week x 26 weeks/year

Table T-6

- CR - 100 mg/day
- FI - 50 percent
- EF - 2 days/week x 26 weeks/ year

Table T-7

- EF - 2 days/week x 26 weeks/year

Table T-8



- CR - .005 L/hr
- ET - 3 hours/day
- EF - 2 days/week x 26 weeks/year

Table T-9 and T-10

- ET - 3 hours/day
- EF - 2 days/week x 26 weeks/year

Table T-17

- CR - .005 L/hr
- ET - 3 hours/day
- EF - 2 days/week x 26 weeks/year

Table T-18

- ET - 3 hours/day
- EF - 2 days/week x 26 weeks/year

Table T-19

- FI - 50 percent
- EF - 2 days/week x 26 weeks/year

Table T-20

- EF - 2 days/week x 26 weeks/year

Tables T-9 and T-18

"RC - Chemical-specific (Table 7-17)"

"RC" should be "PC."

251. Appendix U, Page 1 - Region V does not believe that it is reasonable to assume that anyone is exposed to an "average" groundwater contaminant concentration, as residents do not use water from multiple wells. The concentration values (or 78 values) which represent the center of the plume concentration should be used in the risk assessment; usually these are the highest concentration values detected in this medium. The use of the highest concentration values should not be considered to be a worst case calculation, as groundwater sampling locations at Superfund sites are usually chosen to determine the extent of the contaminant plume, rather than to assess the plume concentrations. In Tables U-1 through U-4, the maximum detection concentration should

generally be used as the exposure point concentration, unless a different concentration can be justified.

252. Appendix U, Page 2 - "The 95 percent upper confidence limit of the arithmetic mean (95% UCLM) is used to estimate exposure concentration." This statement is misleading. While the arithmetic mean of log-transformed data has been calculated, this value, when exponentiated, represents the geometric mean of the data. It is the 95 percent UCL of the geometric mean that has been calculated and considered in determining the exposure point calculations. Use of the 95 percent UCL of the geometric mean assumes that the data are distributed log normally. Although this assumption may be a valid one, it should be stated explicitly in Appendix U.
253. Appendix U, page 3, Paragraph 1.4 The phrase *For each operable unit*" should read *for each media of interest*".
254. Appendix U, Page 3, Exposure Point Calculation - In 2.2, clarify that the arithmetic mean of the transformed data set is actually the geometric mean, and that a "modified geometric mean was used to estimate the true mean" in step 2.7. In general, a) data rarely adheres to a strictly lognormal distribution; b) for descriptive statistics, the distribution is usually irrelevant; and c) the use of the modified geometric mean is usually only preferred when the coefficient of variation (COV) is  $>1.2$ . To justify the use of the statistic given in 2.7, it is necessary to include a calculation of the COV and to verify that the distribution is lognormal. The calculated estimate of the true mean presented here is biased if the distribution is not lognormal, so it is important to test the data before applying this formula. It is also incorrect to refer to this mean as the arithmetic mean in the text; the true nature of the statistic should be specified in the text, so that the reader is not misled. In general, the use of the arithmetic mean will save a multitude of calculation and will give nearly the same result as the modified geometric mean.
255. Appendix W - The modeling techniques described in Appendix W also represent a conservative approach which will likely overestimate concentrations.

### Emission Rate

In Appendix W, the PM<sub>10</sub> emission rates are estimated using a method by Cowherd. Use of this method requires input of several meteorological parameters including a surface

roughness coefficient. The surface roughness coefficient used to generate a PM10 emission rate represents a flat grassy surface with no buildings, hedges, or trees nearby and was selected from Figure 4-1 (U.S. EPA, 1985). This is very conservative and should be reviewed. Based on Site Meteorological Program Guidance for Regulatory Modeling Applications EPA-450/4-87-013 (U.S. EPA, 1987), a change in the surface roughness coefficient may be appropriate and would decrease the PM10 emission rate.

The Cowherd method for determining emission rates is specific for particulate matter. The use of it to generate emission rates for volatiles and some semivolatiles is not appropriate, although it could be used for semivolatiles which are likely to be attached to particulates.

## Modeling Techniques

The method to determine the ambient air concentrations was based on suggestions by Cowherd. This method employs conservative estimates and applies to broad geographic areas. More accurate predictions of ambient air concentrations could be provided using the ISCLT model and a Chicago, Illinois wind direction frequency distribution, as described in the review of Appendix V. Again, the effort required to use the ISCLT model would be relatively minor.

### *Sources Reviewed for Comments for Appendix W*

*Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites.* U.S. EPA 600/8-85/002. U.S. EPA, 1985.

*On-Site Meteorological Program Guidance for Regulatory Modeling Applications.* U.S. EPA 450/4-87-013. U.S. EPA, 1987.

*Superfund Exposure Assessment Manual.* U.S. EPA 540/1-88/001. U.S. EPA 1988.

*Air/Superfund National Technical Guidance Study Series Volume II Interim Final.* U.S. EPA 450/1-89-002. U.S. EPA, 1989.

256. It is preferable to include site descriptions, figures and maps in the Baseline Risk Assessment as this document is often used as a stand alone. The reader may not have access to the previous section.

## Example Analysis for Ecological Assessment

In the Remedial Investigation Report for the ACS-NPL site, three types of habitats are described. Two wetland areas occur on the site, and are described in a wetland delineation done by the USFWS as having high natural resource value due to the diversity of habitat types. In the northwest corner of the site is a mature oak hardwood stand, and the inactive landfill and part of the off-site containment area provide some field (grassland) habitat.

The Remedial Investigation states that the ACS watershed is hydrologically isolated. Water sources are primarily from precipitation within the watershed, and most discharge is through evapotranspiration and infiltration. Prior to the early 1980's, surface water flowed through a drainage ditch and discharged to a wetland south of the active landfill area. The landfill has expanded, and this ditch is dewatered and no longer acts as a surface water runoff route. A ditch west of the off-site containment area is a surface water flow path which drains toward the landfill excavation. Groundwater discharges into the latter drainage ditch and into Wetland I.

Most of the surface drainages described are ephemeral ditches. Based on the density of cattails around it, a ditch through Wetland I appears to contain water much of the year. Fish and Wildlife Service has reported fish are present in this ditch.

Permanent ponds on the site include a fire pond and process lagoon on the ACS property and a disposal cell at the landfill. The ACS plant ponds do not provide aquatic habitat because of their industrial use. Water is continually being pumped from the disposal cell on the landfill in anticipation of future use.

The Fish and Wildlife Service delineated and described two wetland areas in the Site watershed. The northern wetland, designated Wetland I, is approximately 20 acres, while Wetland II, located south of the Chesapeake and Ohio railroad tracks, is approximately 5 acres. The wetland communities are described in the RI report.

Mature oak forests are located on the western and northeastern corners and on the eastern side of the site. The perimeter of the woods includes species typical of disturbed areas, such as cottonwoods, aspens and sumacs. The inactive landfill and parts of the off-site containment area provide some field (grassland) habitat. The remaining terrestrial areas are developed or are devoid of vegetation.

Based on the types of habitat present on site, the following species was evaluated for potential risks: mink. Mink was evaluated due to the type of habitat existing at the site and due to its sensitivity to the organic contaminants at the site. Weasels would also be included in this type of evaluation.

Contaminants of ecological concern are those detected in environmental media of the habitats on-site. These habitats, and environmental media which are sampled, include:

- Wetland surface waters and sediments
- Drainage ditch surface waters and sediments
- Soils from the off-site containment area

Chemicals of concern for terrestrial habitats are considered to be those chemicals found in shallow soils (< 4 feet depth). Chemicals found in deeper soils are generally not readily available to biological communities. However, migration of contamination to the groundwater has occurred on-site, and there is groundwater discharge into Wetland I. Risk calculations will be done using concentrations found in shallow soils, and also assuming potential exposure to maximum concentrations found in deeper soils via groundwater discharge.

Contaminants of ecological concern are listed in Table 7-39 of the RI Baseline Risk Assessment. Background for organic contaminants and for metals in surface waters is considered to be zero. Background concentrations for metals in soils are included in Table 7-39.

PCB values used are for total Arochlors. Seven of the metals found in surface waters exceeded either acute or chronic U.S. EPA Ambient Water Quality Criteria (AWQC). The Remedial Investigation did not address metal levels as it stated that the highest metal concentrations found in sediments were for metals which are considered essential plant nutrients. However, nonessential trace metals can be toxic at much lower levels (Eisler 1985). Because of a lack of data, this risk assessment will be conservative. Maximum contaminant concentrations found on-site will be used as exposure levels, and 100% availability of contaminants will be assumed. One method used to determine availability of contaminants in sediments, the Equilibrium Partitioning approach (U.S. EPA 1988), uses the amount of a substance bound by sediments (unavailable) and the concentration in the interstitial water (available). This ratio depends on grain size and total organic carbon (TOC) content, which were not measured for sediment samples from this site. Therefore, 100% availability will be used.

The contaminants used in this assessment were chosen for the following reasons:

They are compounds which bioaccumulate in the food chain--PCBs and cadmium (Eisler 1986, Hammons et al. 1978).

Data is available on which assumptions about contaminant exposure of an organism via uptake through food items can be based.

Literature values are available to determine concentrations above which exposure poses a risk to an organism.

### **MINK**

The home range of a mink is approximately 20 acres (Linscombe et al. 1982), and the area of Wetland I on the ACS site is 29 acres. Calculated doses are multiplied by an area use factor to weight the estimated dose by the proportion of time the animal is expected to use the contaminated resource relative to its home range. The assumption is made that habitat on the home range is homogeneous, and that the animal spends an equal amount of time in each portion of the range. Since Wetland I is larger than the average home range for mink, the area use factor is 100%. Therefore, 100% of the diet will be consumed in the contaminated wetlands on the ACS site.

To determine risk due to ingestion of contaminated prey, a contaminant concentration in the prey is needed. Mink feed on small mammals, crayfish, fish and amphibians. For PCBs, the bioaccumulation factor (BAF) for small mammals is 0.07 (Charters 1991), for crayfish is 5.1, for frogs is 0.22 (Charters 1991), and for freshwater fish (fathead minnows) is 225,500. Bioaccumulation data are from U.S. EPA AWQC documents for specific chemicals unless stated otherwise. The BAF for the terrestrial species above are conservative as they incorporate soil organic content, whereas for this site it is assumed TOC is zero and availability is 100%. Assuming each of the above species represents an equal portion of the mink's diet, the contaminant dose for PCBs is:

The sum of : Concentration of PCBs in soil/surface water (ppm) \* BAF/BCF for the prey species \* % of diet, which equals:  
 $(500)(0.07)(.25) + (.00084)(5.1)(.25) + (500)(0.22)(.25) + (.00084)(225,000)(.25) = 83.5 \text{ ppm}$

For protection of mink, the maximum permissible tissue concentration of their diet is 0.64 mg/kg (Plantonow and Karstad 1973). Based on the calculated dose, this diet was considered a risk for mink.

For cadmium, the BAF for crayfish is 184, for frogs is 130, and for freshwater fish is 2213. The calculated dose is:  
 $(.00072)(184)(.33) + (159)(130)(.33) + (.00072)(2213)(.33) = 6821.7 \text{ ppm}$   
For mammals, the dietary level of cadmium below which chronic effects should not occur is 100 ppb (Eisler 1985). Exposure from this diet is considered a risk to mink.